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The determinants of United Kingdom student visa demand from developing countries

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Abstract: This paper analyzes the demand for UK educational services by international students through investigating the demand for student visas to the UK from 89 developing countries covering the period 2001 to 2008. The substantive findings of this research are that bilateral exchange rates matter more than per capita income in the source country in driving the volume of applications. An analysis of the country-specific fixed effects suggests a higher demand for visa applications from Muslim countries, from countries sharing a common language with the UK, and from countries geographically proximate to the UK. Political stability within developing countries and their formal human capital levels are also found to be important factors determining the volume of visas issued.

JEL codes: C23, F14, F22, I29

Keywords: Visa applications; Issues; Demand for education; Fixed effects estimator

I. Introduction

The UK has the second largest number of international students enrolled in higher education after the USA. In recent years, the enrolment rates for international students[1] in the UK have exceeded those of non-UK European Union (EU) students. For example, data for 2008/09 from the Higher Education Statistics Agency (HESA)[2] reveal that international student enrolments grew by 9.4% compared to 4.9% for non-UK EU students, and 3.2% for UK students[3]. In contrast, data are not centrally or systematically collected for the private educational sector (comprising those studying either English language for more than six months or A-levels, and those in vocational training, further education (FE), pre-university preparation, and higher education (HE). However, it is thought that in recent times these international students have numbered between 150,000 and 200,000 (UK Council for International Student Affairs 2010). A British Council (2010) report, covering the fiscal year 2009/10, estimates that the number studying on English Language courses in the UK in any given year could be as high as half-a-million and calculates that the English language tuition industry is currently worth somewhere between £3 billion and £4 billion per annum to the UK economy.

The total value of UK exports of education services[4] in 2003/04 was calculated at £8.6 billion (Lenton 2007), with a more recent British Council report estimating international education and training exports to be currently worth in excess of £12.5 billion (British Council 2010). It is evident that international students contribute significantly towards the revenues of educational institutions, and more broadly to the UK economy[5]. In

addition, their presence in the UK is generally regarded as having positive cultural benefits, and helps create future opportunities for increased trade, investment and political influence. Indeed, the importance of international students to the UK was acknowledged by the government when the Prime Minister's Initiative for International Education (PMI) was launched in 1999, and a second recent phase (PMI2) initiated in 2006 designed to attract an increased number of international students to the UK[6].

The global demand for international education is anticipated to increase dramatically in the near future. Bohm *et al*. (2004) forecast that the demand for international student places will increase to approximately six million by 2020 with Asia predicted to comprise about three-quarters of the increased global demand across the five major English-speaking destinations[7]. The emphasis of the present research on developing countries is important as the demand for UK education services from this source is expected to be higher in the future than from other countries[8]. A recent estimate from the OECD (2011) predicts that about 10% of all those studying abroad are in the UK, compared to 18% in the USA, 7% in Australia and 5% in Canada.

In recent decades, immigration flows have persistently exceeded emigration flows resulting in the UK being a country of net immigration (Hatton 2005). The significance of international students is further underscored by the fact that they comprise the largest proportion of annual migration inflows into the UK. According to figures from the Office for National Statistics, international student flows are currently the second largest 'migrant' inflows into the UK, having overtaken work-related flows in 2009. While other migration flows have been more or less constant or declined over time, international student flows exhibited an upward trend to 2010. Since then a slight decrease has occurred, which is likely to have been triggered in part by student visa policy changes.

In spite of the importance of international students from developing countries to both the UK educational sector and the economy, there are features of the demand for UK education services from such countries that are not well understood. In order to fill these lacunae, the current paper examines the phenomenon indirectly through investigating the determinants of the demand for UK student visas from developing countries (including emerging economies) using, among other sources, data obtained from UK Border Agency (UKBA) publications. Previous studies that have examined the demand for UK visas have mainly done so within a tourism demand framework (see Oxford Economics 2008, Blake and Cortes-Jimenez 2007) [9]. Other studies have approached the topic from a migration perspective (see Pedersen *et al*. 2006, Clark *et al*. 2007, Grogger and Hanson 2011, Ortega and Peri 2009, and Mayda 2009). To the authors' knowledge, the current research constitutes the first attempt to model student visa demand to the UK from exclusively developing countries. The study's key research questions relate to determining the magnitude and sensitivity of student visa demand to changes in source country income levels, visa costs and bilateral exchange rates. A number of other themes are also interrogated. These relate to the importance of trading links between the UK and the set of developing countries in influencing the level and pattern of student visa demand, the effect of geographic and cultural closeness, the impact of the July 2005 London bombings, and the role of source country human capital levels.

The organization of the paper is now outlined. Section II provides a review of the literature broadly germane to the analysis of student visa demand, Section III outlines the data used and describes the key variables proposed for analysis, Section IV presents the

econometric model and details the estimation procedure, Section V reports the empirical findings, and Section VI offers some concluding remarks.

II. Literature review

The demand for higher education is typically modelled in the literature using gravity model techniques. Examples of studies that have adopted this approach include Agasisti and Dal Bianco (2007) who investigate the determinants of student mobility for higher education within Italy and find that an increase in distance deters student migration while university resources and a locality's socio-economic conditions encourage it. Sá *et al.* (2004) investigate the determinants of university demand for Dutch high school graduates in 2000 and find evidence of distance deterrence and a positive effect of regional/urban amenities. González *et al.* (2011) estimate factors influencing Erasmus student flows within Europe and find country size, cost of living, distance, and several other factors to be significant determinants.

The use of gravity models is generally appropriate in a context of bilateral flows between regions or countries. The UK was believed to be the sixth largest source of international students globally in 1975 with 16,866 students leaving the country to study abroad. However, this figure rose only modestly over time, reaching 22,400 in academic year 2005/06 (Findlay *et al.* 2010). Moreover, most of these flows have been to OECD countries[10]. A popular route through which UK students study abroad is the Erasmus programme[11]. However, it is a European programme and only one country in our sample (Turkey) participates in it. Statistics from the Office for National Statistics reveal that both presently and in the past, student migration has constituted the least significant portion of migration outflows from the UK. Thus, given such low demand for education by UK students in the countries represented in our study, the gravity approach would obviously be an unsuitable choice of empirical modelling for the current application.

Another strand of literature emphasises immigration policies at home and abroad as the main immigration drivers. For example, Clark *et al.* (2002) estimate the determinants of immigration rates in the US by source from 1971 to 1998 in the context of immigration policy changes such as the abolition of country quotas in 1965, which were replaced with a family reunification system. They find that income, education and demography matter in determining immigration flows, as well as the stock of previous immigrants and immigration policy. However, evidence from other studies suggests that much of the variation in immigration can be explained by economic forces. Such studies include Cobb-Clark and Connolly (1997) for Australia, Karemera *et al.* (2000) for the US and Canada, and Karras and Chiswick (1999) for Germany.

A small number of econometric studies have explicitly analysed the demand for visas from developing countries to a single developed country. These empirical studies have generally conflated visa categories[12], though Blake and Cortes-Jimenez (2007) disaggregate by visa type. The Oxford Economics Report (2008) analysed the impact of visa fees on short-term visa applications and issues and found no overall impact of a visa fee increase, though a negative impact for the July 2005 London bombings was detected. Per capita income and exchange rates exerted significant roles, while the estimated effects for trade variables were found to be statistically significant only for the lowest income groups. Blake and Cortes-Jimenez (2007) explicitly modelled the demand for UK

inbound tourism and estimated income and price elasticities for seven source markets each delineated across separate visa categories. For study visits, the average income elasticity across the seven countries was estimated to be 1.35 with Germany the only country yielding a statistically significant estimate (−1.15) for the visa price elasticity of demand. Dritsakis and Athanasiadis (2000), using Greek data, found neither income nor exchange rate effects to be statistically significant, which is in contrast to Garín-Muñoz and Amaral (2000) who, examining the impact of selected economic determinants on the international demand for tourism services in Spain between 1985 and 1995, report elasticities of 1.40, 0.50[13], and −0.30 for real per capita income, exchange rates and real prices respectively.

The findings of Kulendran and Wilson (2000) indicate that countries that have increased their international trade flows have also increased their international travel flows, and *vice versa*, presumably due to the increased interest and awareness generated by such trading activities. They find evidence of a one-way causality from exports to holiday travel in the USA. Other studies have examined the impact of one-off events related to terrorism on visa demand (e.g., Neiman and Swagel 2009, Araña and León 2008, Dritsakis and Athanasiadis 2000). Neiman and Swagel (2009) conclude that new visa policies post-9/11 did not play a salient role in reducing travel to the United States in the two years immediately after the terrorist attacks in 2001.

The demand for student visas could also be explored within a migration perspective since some categories of student could be characterized as belonging to temporary migrant categories. Pedersen *et al.* (2006) reveal that migration generally responds to economic variables, as well as factors such as culture, language, distance, and migrant networks. Grogger and Hanson (2011) confirm the importance of language and geography in determining migration patterns. Lowell and Khadka (2011) note that tighter visa policies implemented in the US after 9/11 deterred student immigration, but emphasized that the 2001 recession exerted a greater negative impact. Other papers that have drawn on the migration literature to investigate student immigration include Clark *et al.* (2007), Ortega and Peri (2009) and Mayda (2009).

Hatton (2005) models the variation in net migration for British and foreign citizens, across countries and over time, using data from the international passenger survey (IPS). Improved economic performance in the UK relative to overseas is found to have a positive effect on net immigration. Immigration policies at home and abroad are also shown to have increased net immigration, particularly in the 1990s. Bound *et al.* (2009) examine the determinants and consequences of changes over time in the representation of foreign born students among doctorate recipients in US universities. They find that the growth in the representation of international students among doctorate recipients is influenced by shifts in demand for graduate study among international students due to changes in sending country opportunities, policies and political circumstances. Changes in institutions that affect the costs of matching students with US graduate programs, including the development of international networks, and the financial inducements offered by US universities that differentially affect foreign students, are also found to be important.

In another strand of this literature, Naidoo (2007), using student enrolment figures, examines the determinants of international student mobility to UK universities. Significant determinants include access to domestic education opportunities in the source country, the level of tuition fees in the host country, and the extent of source country

involvement in the global economy. Beine *et al.* (2011), using data from 2007 for 180 origin and 13 host countries, analyzed the determinants of international student location choice and found evidence of a strong role for networks. In addition, a statistically significant effect for living cost factors, as opposed to educational fees, was detected and attractiveness variables, such as the reported quality of universities, were also found to be important. Mazzarol and Soutar (2002) also examined factors motivating international student country choice and argued that economic and social forces within the home country served to 'push' students abroad but the decision as regards the choice of host country is dependent on a variety of 'pull' factors.

Rosenzweig *et al.* (2006) examined student mobility to developed countries from a human capital perspective and argued that students move due to the dearth of educational facilities in their home country. Studies by Gordon and Jallade (1996), Aslanbeigui and Montecinos (1998), and Szelényi (2006) confirm that quality differences in education between foreign and domestic degrees are among the main motivations for students to pursue university studies abroad. Van Bouwel and Veugelers (2010) uncovers a positive role for quality of education indicators in influencing both the size and direction of student flows. Finally, Kahanec and Králiková (2011) conclude that the quality of higher education institutions and the availability of programmes taught in the English language provide important incentives in attracting international students.

The foregoing review, albeit drawn from a number of different strands, is helpful in identifying candidate variables for inclusion in the regression models used in this study. We argue that the interpretation of international students as long-stay tourists appears somewhat more plausible than their characterisation as temporary skilled migrants. The majority of those on student visas, who are legally entitled to work part-time while studying in the UK, tend to work in unskilled jobs (e.g., in the retail, call centres, the health care sector, and hospitality industries). In addition, Achato *et al.* (2010), using administrative data extracted from UKBA sources, found that only about 20% of those granted student visas in 2004 were still in the UK by 2009, and only 3% of these had achieved settlement status by the same year. A probable reason for this is that time spent in the UK under a student visa does not contribute towards settlement eligibility[14]. A more recent Home Office study also found that of the students who entered the UK in 2006, 82% no longer remained in the UK as settled residents or in the immigration control system by the end of 2009, while 5% remained as students, 12% obtained other forms of leave to remain, and 1% secured settlement or indefinite leave to remain (Home Office 2013).

III. Data

The unit of observation for the analysis is the international students' country of origin. The data cover the period 2001 to 2008 and countries with fewer than four visa observations are excluded to ensure adequate information is available within each country for the empirical analysis. Having eliminated missing observations on an array of variables, the final sample comprising usable data for all our relevant variables features 89 countries across five global regions (see Additional file 1 for the country list). Sixty-six of the countries have the full eight years of data and 76 have at least seven. Thus, although the panel is not perfectly balanced it could be described as being strongly so.

The two dependent variables of primary interest are the number of student visa applications and the number of visas issued both expressed per 100,000 of origin country population. We believe there is merit in modelling both these aggregate measures as they reflect the outcomes of different behavioural processes. The former relates to individual behavioural decisions, while the latter potentially reflects the effects of government policy decisions. The visa statistics are obtained from the UKBA's publication *UK visa Entry Clearance Statistics*, which was published on an annual basis and provided visa application and visa issue data for all countries[15]. An advantage in using UK student visa data is that, in contrast to other visa categories, the definition has been immutable over the period under consideration here. In addition, the data are administrative and thus likely to be accurate. However, some potential limitations of these data merit comment. First, visa data are available on an annual basis but only reported for the fiscal year running from the 1st of April to the 31st of March, while all other data are available on a calendar year basis. For instance, the economic data are based on the calendar year corresponding to the first of the two fiscal years and thus influence visa demand with a quarter-year lag. Second, the reported visa statistics (both applications and issues) do not distinguish between different student categories as the data are not disaggregated by type (i.e., language students, A-level and FE students, HE undergraduates and postgraduates). The determinants for these separate student categories are likely to differ. However, we were unable to obtain separate figures for the different student categories. This is because for the period of analysis, visa data from the UKBA only provided aggregate figures for student applications and issues, without differentiating by study type. Nevertheless, it is widely acknowledged that the majority of international students are enrolled in higher education institutions. The Home Office now reports data on the proportion of international students studying at different levels and types of institutions using information on confirmation of acceptance studies (CASs)[16], a policy reform introduced in 2010. The data reveal that in 2012, 75% of visa applications were for HE institutions, 15% for tertiary, FE or other colleges, 2% for English language schools, 7% for independent schools, and 2% for other institutions. Although these figures post-date the period of our data, the dominance of higher education and tertiary colleges in our visa data is likely to be the case even given the various policy changes documented above. Finally, it should be noted that our data do not include student visa applications from those resident in another (third) country but nationals of, and ordinarily resident in, a developing country.

It could be argued that the volume of students from European Union (EU) countries could displace or affect the demand of those from non-EU countries. However, the share of these students in total overseas numbers is modest. For instance, 30% of non-UK domicile students in higher education in 2010/11 were from the EU with the remainder originating from other countries (Higher Education Statistics Agency HESA 2013). The demand for UK higher education by international students is greater than that of students who are nationals of EU countries despite the fact that the latter do not require a visa to study in the UK and pay the same tuition fees as their UK counterparts. We believe it unlikely that the demand for education by students from the EU adversely affects that of international students.

The data on visa fees are obtained from the Office of Public Sector Information. In addition to the change in visa costs over the years, the structure of costs has also changed. For the purpose of our research, one fee per year is used, though for some years more

than one charge is reported as rate changes can occur mid-year. In 2001, visa costs ranged from £33 to £80 depending on the type of entry (single or multiple) and length of stay. In July 2002, the single entry visa was abolished and a new fee structure ranging from £36 to £150 was introduced for multiple entry visas valid for between six months and ten years. In July 2005, all visa fees, except the multiple entry six-month one, were consolidated into a single fee of £85 with the former increased from £36 to £50. In April 2007, all fees were again consolidated into a single charge of £99 and this remained unchanged for 2008. For the period 2001 to 2004 we use the visa fee for multiple entries, valid for two years from the date of issue as the next category is for five years. We believe the use of this visa category is reasonable as most degree and other study programmes in the UK are for less than five years in duration. Putative students are most likely to apply for a two-year category visa in making their applications. From 2005 onwards, the consolidated fees are used. In addition, in order to account for inflation, we deflate the visa cost by the UK GDP implicit price deflator as obtained from the World Bank's World Development Indicators.

The data on developing country GDP per capita (expressed at constant 2000 US dollars) are obtained from the World Development Indicators (WDI). Bilateral exchange rates prevailing at the end of July for each of the eight years from 2001 to 2008 are used[17]. These are obtained from the International Monetary Fund (IMF)'s International Financial Statistics (IFS) database. The IFS reports these as local currency units per Special Drawing Rights (SDR), which are then converted into local currency units per pound sterling using the appropriate SDR/sterling exchange rate.

Import and export shares are obtained from the United Nations Commodity Trade Statistics Database (UN Comtrade). Total imports into the UK from each country and total exports from the UK to each country are obtained from this source. Import and export shares for the 89 developing countries are then calculated by dividing these country-specific figures respectively by the total import and export values for the UK in each year. The percentage values of these are used in the empirical analysis.

A dummy variable designed to reflect the impact of the 7/7 London bombings in 2005 is constructed and takes a value of one if the year is post-2005 and zero otherwise. This variable is discussed in greater detail in the next section. A number of other variables are also used at the second-stage of our econometric analysis and these are best interpreted as either time invariant or moving glacially over time. For instance, time-invariant variables for whether the developing country shares a common official language with the UK and the geographical distance between London and the 89 capital cities are used. The proportion of the country's population that is Muslim is included to determine the relationship between Muslim countries and the international demand for UK educational services. The realisations for this particular variable are likely to change imperceptibly over the short period of time covered by this study and its approximate treatment here as time-invariant appears fairly innocuous.

Source country educational outcome variables, which are the net enrolment rates for both primary and secondary schooling, are also used in the empirical analysis. These variables are clearly not time invariant but suffer from the drawback of only being sporadically available for developing countries, which is particularly the case for the latter. The relevant data are obtained from the World Bank Education Statistics database but a regional average is used as an alternative when these data are absent.

Finally, an indicator is used to proxy for a country's political stability. The data for this measure are obtained from the Worldwide Governance Indicators (WGI), which contain aggregate and individual indicators for 212 countries and territories over the period 1996 to 2008 (see Kaufmann *et al.* 2009). The WGI defines governance broadly as "….the traditions and institutions by which authority in a country is exercised". Political stability and the absence of violence captures perceptions of the likelihood that a government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism. The measure combines the views of various enterprises, citizens and expert respondents in industrial and developing countries and is measured in standardized units ranging from about −2.5 to 2.5, with higher values corresponding to greater political stability. Given that the governance measure tends to move fairly leisurely over time, an average value is used in the second-stage of our empirical analysis.

The Appendix contains a table that provides a description of the variables used and corresponding summary statistics. In addition, Figure 1 in this appendix presents a short time series of student visa applications per 100,000 of origin country population aggregated across three global sub-regional markets (*viz.*, Asia, Africa and the Americas). The plot reveals the importance of the Asian markets, which are largely driven by applications from China and India. Figure 2 reports a similar pattern for visa issues per 100,000 of the population across these three regional markets.

IV. Empirical methodology

The primary regression equation used exploits a fixed effects estimator and is specified as follows:

$$v_{it} = \alpha_i + \beta_1 y_{it} + \beta_2 x_{it} + \beta_3 c_t + \beta_4 im\_share_{it} + \beta_5 ex\_share_{it} + \beta_6 D\_7/7_t + \sum_{i=1}^{89} \delta_i T_{it} + u_{it} \quad (1)$$

where:

i = 1,2,…,N country level observations, and t = 1,2,…,T time series observations, where N = 89 and T = 8;

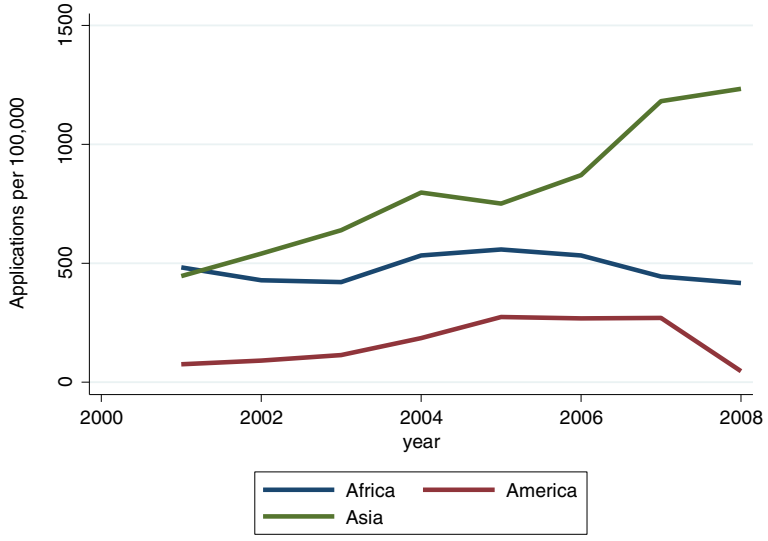

Figure 1 Visa applications per 100,000 by region.

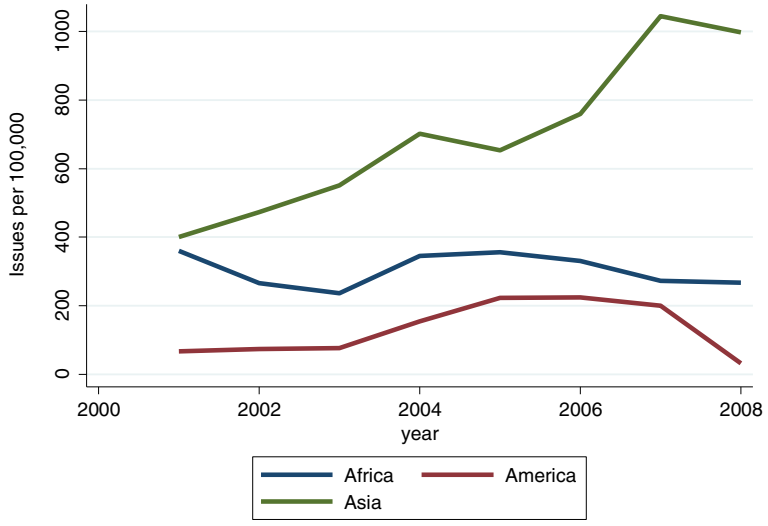

Figure 2 Visa issues per 100,000 by region.

v_{it} is a continuous dependent variable expressed as the natural logarithm of either the number of visa applications or visas issued per 100,000 of the population from origin country i in year t;

α_i captures the 89 country-level fixed effects, assumed constant over time;

y_{it} is the natural logarithm of GDP per capita for the i^{th} developing country in year t expressed in US dollars at constant 2000 prices;

x_{it} is the natural logarithm of the bilateral exchange rate between the UK and the i^{th} developing country in year t expressed in local currency units per pound sterling;

c_t is the natural logarithm of real UK student visa costs in year t;

im_share $_{it}$ is the i^{th} developing country's share of UK imports in year t expressed as a percentage;

ex_share $_{it}$ is the i^{th} developing country's share of UK exports in year t expressed as a percentage;

D_7/7 is a dummy variable which equals 1 if the observations are post 7/7 (i.e., post-2005) and 0 otherwise;

T_{it} is the i^{th} country's time trend and u_{it} is an error term.

Real GDP per capita is the scale measure used to capture a country's per capita income and the exchange rate potentially provides a proxy for the educational and living costs in the UK facing a student from a developing country. It is sometimes argued that tourists respond to exchange rate movements rather than changes in relative inflation rates when making travel decisions. This is also likely to be the case for potential students, who may be well-informed about changes in exchange rates but less so on price changes at their destinations[18]. Given that the exchange rate is expressed in local currency units to the pound sterling, when the exchange rate rises (i.e., when there is a devaluation of the local currency), it becomes more expensive to apply for a student visa and, more importantly, to cover tuition and living cost expenses in the UK. Student visa applicants are likely to be sensitive to such changes when deciding whether or not to

apply to UK educational programmes. Visa costs capture the expense of a student visa application. Given the corresponding variables are all expressed in natural logarithms, the parameters β_1, β_2 and β_3 all have direct elasticity interpretations.

The import and export shares represent the intensity of the trading relationships between the UK and the developing countries[19]. A strong trading relationship could potentially encourage greater understanding between countries and attract more student visa applications from UK trading partners. It could also increase cultural awareness between countries and hence increase student numbers through an increased interest, awareness and understanding of the UK.

The post 7/7 dummy permits an assessment of the impact of the July 2005 London bombings on UK student visa applications and the number of visas issued. Its inclusion enables an analysis of the effect of the bombings on the volume of these two outcomes. The inclusion of this variable assumes a shift change in applications that is common across all countries. We believe this is plausible as we wish to capture concerns among potential students from all countries about safety and their personal security, as well as risk perceptions and other psychological reactions to the fears induced by the incident. It may also capture an expectation among some potential applicants of a harsher policy response as mediated through a greater scrutiny of applications by UK border authorities, and may thus impact more on the volume of visa applications than issues. Of course, we cannot preclude the possibility that this dummy captures other common features post-2005 that are independent of the terrorist attack but it is hoped that the empirical model is adequately specified in regard to other variables that capture such features to attenuate the effects of this potential problem. However, we do explore the robustness of estimates for the other covariates included in our specifications through estimating separate models that both include and exclude this variable.

The inclusion of 89 country-specific time trends is designed to capture trend effects in applications and issues, which are not directly observable but may be highly correlated with time (e.g., changes in preferences and tastes). According to Nordström (2004), an interesting feature in most tourism demand models is that a large part of the variation in demand can be explained by a change in taste. There is no reason to suppose that tastes are not important in student destination choice. Thus, the taste effect is approximated through the inclusion of country-specific trends in the reduced form visa demand equation[20]. In addition, there may also be other unobservable country-specific trending factors that affect student visa demand over the period that these trends capture[21].

Serial correlation and heteroscedasticity are problems regularly encountered in panel applications. A number of fairly straightforward tests are available to detect both phenomena in the linear fixed effects model. We test for an AR(1) process in the first differenced form of Equation (1) using an approach suggested by Wooldridge (2002), which exploits the residuals from a pooled regression model. The test is an F-test with one degree of freedom on the numerator. In order to test for the presence of heteroscedasticity, we exploit a panel version of the White (1980) test. This involves retrieving the squared residuals from the fixed effects model in (1), and performing an auxiliary regression of these on a constant and the original covariates from (1). The LM test is computed as $N(T-1)\times R^2$, where the R^2 is the unadjusted R^2 from this auxiliary regression. The test has an asymptotic chi-squared distribution with degrees of freedom determined by the number of variables included in (1). In the presence of both serial correlation and heteroscedasticity,

Stock and Watson (2008) suggest use of a cluster-robust variance-covariance matrix, where clustering is on the basis of the origin country.

An obvious constraint associated with using a fixed effects estimator is that the effects of time invariant factors cannot be directly identified. Thus, an additional part of our empirical analysis involves retrieving the set of 89 country-specific fixed effects from the within regression model and regressing these on a set of time invariant factors. As discussed in the data section, the time-invariant factors include whether the country has English as an official language and its geographical distance from the UK. In addition, we also examine the impact of variables that either move slowly or are only available sporadically across these countries over time. The former category includes variables for the Muslim proportion of a country's population and the political stability index with the latter including a country's primary and secondary enrolment rates.

V. Empirical results

The first column of Table 1 contains the estimates for the visa applications' equation. The diagnostic tests reveal evidence of both serial correlation and heteroscedasticity and, following Stock and Watson (2008), motivate the use of clustered robust standard errors. These are robust in the presence of a general form of heteroscedasticity and clustered by country of origin to account for serial correlation. The coefficient estimates are broadly in comport with evidence from the existing tourism literature with positive income and negative exchange rate effects reported, though the former is not found to be statistically significant at a reasonable level. The estimated effect for the visa cost is also not found to be statistically distinguishable from zero. This is perhaps unsurprising given the relatively small share of visa costs in the total educational costs incurred by student applicants. In addition, there is limited variation in this measure across time, as revealed by its reported standard deviation in Table 4 in Appendix 1. Thus, there may be inadequate information contained in this variable to empirically identify the estimated visa cost effect.

The trade effects are found to be important with increases in a country's share of imports from the UK raising demand for student visa applications. Specifically, if a country's share of UK imports increase by 0.01 of one percentage point – a fairly sizeable change for most countries in this sample – visa applications rise, on average and *ceteris paribus*, by close to 2%. In contrast, the estimated effect for export shares is found to be negative suggesting that as a developing country's share of total UK exports rises, the demand for UK student visas falls. This is somewhat counterintuitive and suggests that opening the UK market to imports from developing countries provides a more potent way of increasing student applications than UK commercial access to their domestic markets. The literature appears agnostic on the nature of the relationship between student migration and trade flows and, to the authors' knowledge, this is an area that remains relatively underresearched. In contrast, a substantial literature has examined the relationship between labour migrant stocks and trade flows[22]. However, this literature is not all that informative in providing useful insights on the relationship between student migration and trade flows, and a more systematic investigation of this issue is consigned to an agenda for future research.

The specification reported in the second column of Table 1 now includes the dummy for the 7/7 bombings. Most of the other estimates in this specification are comparable to those

Table 1 Determinants of UK student visa applications

Variables	(1)	(2)	(3)
Log of GDP per capita	0.7030	0.7810*	1.0033
	(0.4515)	(0.4446)	(0.6726)
Log of exchange rate	−0.7665**	−0.7516**	−1.4193***
	(0.3030)	(0.3053)	(0.4053)
Log of real visa cost	−0.2041	−0.0729	0.1180
	(0.3822)	(0.3481)	(0.3980)
Import share (%)	1.9717**	1.9109**	1.7573*
	(0.9944)	(0.9863)	(1.0147)
Export share (%)	−1.0324***	−1.1115***	−1.0807***
	(0.2496)	(0.2556)	(0.2624)
Post 7/7 Dummy		−0.1789**	−0.1179
	†	(0.0759)	(0.0824)
Lagged Refusal Rate (%)	†	†	−0.0072*
			(0.4138)
Country-specific fixed effects included	Yes	Yes	Yes
Country-specific time trends included	Yes	Yes	Yes
Number of observations	661	661	566
Number of Countries	89	89	89
Serial Correlation Test (F-test)	27.049***	27.044***	13.389***
	[0.000]	[0.000]	[0.000]
Heteroscedasticity Test (Chi-squared)	313.6***	315.3***	314.6***
	(0.000)	[0.000]	[0.000]
R-squared (within)	0.538	0.541	0.511

Notes:
(1) The estimation period is 2001 to 2008 (inclusive).
(2) The fixed effects estimator is used in estimation.
(3) The dependent variable is the log of student visa applications per 100,000 of the country of origin population (see Equation (1) in the text).
(4) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(5) Clustered robust standard errors are reported in parentheses for regression model estimates and prob-values are reported within the squared brackets for the diagnostic tests. See text for a discussion of the serial correlation and heteroscedasticity tests.
(6) The regression model includes 89 country-specific time trends, which are not reported here to conserve space.
(7) † denotes not applicable in estimation.

reported in the first column of this table, though now the income variable registers significance at the 10% level using a two-tailed test. The estimated effect for the 7/7 dummy suggests that post-2005 applications contracted by 16.4%, on average and *ceteris paribus*. This finding cannot be ascribed to the increase in visa fees post-2005, since visa costs are already included in the regression model. Adverse one-off events are generally found to impact on tourism demand, though their effects tend to be strongest closer to the event and to dissipate with the passage of time (see Araña and León 2008). The result could be taken to reflect an increase in security concerns and heightened risk perceptions among applicants, which may have led to a decrease in UK student visa demand[23]. However, it could also reflect, among some potential applicants, the anticipation of a tighter and more stringent vetting process on the part of UK border authorities, the ultimate effect of which was to deter more marginal applicants. The specification reported in the final column of Table 1 now includes the lagged refusal rates. The estimated effect is negative and statistically significant

at the 10% level using a two-tailed test. The point estimate suggests that a one percentage point increase in the refusal rate reduces applications by 0.72%, indicating that some learning is occurring among potential visa applicants. However, the estimated effect on the 7/7 dummy is now statistically insignificant.

Table 2 reports the estimates for the model based on visa issues where the first column contains estimates for the model excluding the 7/7 dummy. The estimated income effect is again found to be poorly determined though the findings for the exchange rate and the trade shares are comparable to those reported in Table 1. In comport with the findings of Table 1, the visa cost variable remains statistically unimportant, and the post 7/7 effect reported in column two of this table also fails to achieve significance. Thus, the issue rate of student visas was unaffected by the 7/7 bombings suggesting that, in contrast to the US post 9/11, official UK visa policy was not influenced by the terrorist acts perpetrated in London in July 2005. This also supports the notion that the negative effect observed in the visa applications' model in column two of Table 1 most likely reflects applicant anticipation of tighter security and vetting policies[24].

The estimated fixed effects from the specifications reported in column two of Table 1 and column one of Table 2 are retrieved and used in a second-stage regression analysis to examine the role of country-specific time invariant (or slowly moving/sporadically available) factors on visa applications and issues[25]. Table 3 reports the OLS estimates for the second-stage analysis. It is salutary that both regression models comfortably pass almost all the OLS residual-based diagnostic tests[26]. There is broad agreement from Table 3 on the estimated effects across the two visa measures. Muslim countries remain an important source of demand for UK educational services with a one percentage point increase in the Muslim population share yielding a 2.0% (2.3%) increase in visa applications (issues) per 100,000 of the population. If the country shares a common language with the UK, this is also found to be an important determinant, though in the current context most likely captures the effect of Britain's colonial past[27]. Geographical proximity is important as reflected by the estimate for the variable capturing the distance between capital cities. The null hypothesis that the visa applications (issues) elasticity with respect to distance is negative and unitary cannot be rejected by the data. This finding suggests that accessibility and affordability in terms of transport costs matter in influencing student visa demand. It supports the findings of Naudé and Saayman (2005) and Song and Witt (2000) who, using distance as a proxy for transportation costs, also obtain statistically significant effects in their tourism demand applications. Phakdisoth and Donghun (2007) also find their distance coefficient to be negatively signed and highly significant. All else equal, potential students appear to prefer destinations that take less time to get to and are less expensive to reach.

The formal human capital levels of developing countries are found to be important in determining student visa demand. Increases in net primary enrolment rates are associated with reductions in the demand for UK educational services, though the estimated effects are not found to be as well determined in either the issues or the applications models. However, net secondary enrolment rates exert a very well determined positive effect on both applications and issues. In particular, on average and *ceteris paribus*, a one percentage point increase in the net secondary enrolment rate increases the demand for student visa applications (issues) by about 3.5% (3.8%). The greater prevalence of secondary schooling in a developing country is clearly more important in influencing UK educational services demand than the scale of a country's primary schooling levels.

Table 2 Determinants of UK student visas issued

Variables	(1)	(2)
Log of GDP per capita	0.5467	0.5688
	(0.4415)	(0.4448)
Log of exchange rate	−0.7350**	−0.7294**
	(0.3604)	(0.3597)
Log of real visa cost	0.3332	0.3732
	(0.4021)	(0.3655)
Import share (%)	1.9698**	1.9504**
	(0.9681)	(0.9709)
Export share (%)	−1.0885***	−1.1132***
	(0.3317)	(0.3393)
Post 7/7 Dummy	†	−0.0501
		(0.0801)
Country-specific fixed effects included	Yes	Yes
Country-specific time trends included	Yes	Yes
Number of observations	663	663
Number of Countries	89	89
Serial Correlation Test (F-test)	19.300***	19.352***
	[0.000]	[0.000]
Heteroscedasticity Test (Chi-squared)	330.9***	298.8***
	[0.000]	[0.000]
R-squared (within)	0.490	0.491

Notes:
(1) The estimation period is 2001 to 2008 (inclusive).
(2) The fixed effects estimator is used in estimation.
(3) The dependent variable is the log of student visa issues per 100,000 of the country of origin population (see Equation (1) in the text).
(4) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(5) Clustered robust standard errors are reported in parentheses for regression model estimates and prob-values are reported within the squared brackets for the diagnostic tests. See text for a discussion of the serial correlation and heteroscedasticity tests.
(6) The regression model includes 89 country-specific time trends, which are not reported here to conserve space.
(7) † denotes not applicable in estimation.

Finally, the political stability variable was found to be important in determining the volume of visa issues but not applications. The unit of measurement is standard deviations so the scale of the estimated effect needs to be interpreted carefully[28]. The estimated positive effect is relatively intuitive and suggests that visa issues are related to the degree of political stability within a country. This may follow from the fact that in a more politically stable country, it is perhaps easier for applicants to provide proof of identity, qualifications and funding sources than in more dysfunctional and unstable states.

A number of factors were found to be unimportant in the second-stage analysis. For instance, we introduced a dummy for whether the country had a British Council office but this yielded very poorly determined effects in both cases. We also experimented with use of a variable designed to capture the presence of networks in the UK based on whether the developing country was ranked in the top 60 countries in terms of the number of foreign born in the UK. The estimated effects were again found to be poorly determined. This contrasts with previous studies such as Beine *et al.* (2011) and Bessey (2007) who report strong network effects for international students. A former British colony dummy was also introduced but was ultimately omitted as it proved, not surprisingly, highly correlated

Table 3 Determinants of fixed effects for UK student visa models

Variables	Visa applications	Visa issues
Common Language	2.4489***	2.2427***
	(0.6197)	(0.6119)
Log of Distance	−1.6152***	−1.4038***
	(0.5398)	(0.5330)
Muslim (%)	0.0202***	0.0232***
	(0.0077)	(0.0076)
Net Primary Enrolments (%)	−0.0554**	−0.0424*
	(0.0233)	(0.0230)
Net Secondary Enrolments (%)	0.0350**	0.0383**
	(0.0153)	(0.0151)
Political Stability Index	0.5693	0.7871**
	(0.3701)	(0.3655)
Constant	15.267***	12.164**
	(5.288)	(5.221)
Number of Observations	89	89
RESET (F-test)	1.00	3.230
	[0.397]	[0.027]
Breusch-Pagan Heteroscedasticity Test	9.00	10.030
	[0.173]	[0.123]
Jarque -Bera Normality Test	2.39	1.230
	[0.303]	[0.540]
$\hat{o}$ (standard error of regression)	2.462	2.431
R-squared (adjusted)	0.297	0.307

Notes:
(1) The estimation procedure is OLS and standard errors are reported in parentheses.
(2) The dependent variable for the visa applications column is comprised of the 89 estimated country-specific fixed effects from the restricted model (1) in Table 1.
(3) The dependent variable for visa issues is comprised of the 89 estimated country-specific fixed effects from the restricted model (2) in Table 2.
(4) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(5) The RESET is distributed as F(3,79). The reported heteroscedasticity and normality tests are Lagrange Multiplier (LM) tests. The prob-values are reported in the squared brackets beneath these test values.
(6) The F-test values for the null hypothesis that the distance elasticity is equal to minus one is computed as F(1, 82) = 1.30 with a prob-value of 0.26 for visa applications and F(1,82) = 0.57 with a prob-value of 0.45 for visa issues.

with the common language variable and also rendered the Muslim estimate statistically insignificant in both cases[29]. Finally, we also included a dummy for membership of the country group comprising the Prime Minister's Initiative 2 (PMI2), but the estimate failed to register statistical significance at an acceptable level. Thus, the pattern of applications and issues from the 22 countries in our dataset that are part of this initiative are apparently no different from all other countries in the sample, a finding which provides a possible benchmark for the evaluation of this programme for the future, assuming its retention.

VI. Summary and conclusions

This paper used student visa applications and issues data for 89 developing countries over the period from 2001 to 2008 to examine the demand for UK education services by international students. A fixed effects estimator was employed and a second-stage analysis was also conducted to enable the effects of time invariant and slowly changing factors, as well as other variables with limited availability over time, to be estimated.

The results from our primary econometric analysis suggest that bilateral exchange rates matter more than per capita income in the source country in driving the volume of both student visa applications and issues. Further, the effect of visa costs is not found to be statistically significant, a finding possibly attributable to the small proportion that visa costs represent in overall study costs for international students. This finding is in contrast to Green and Koch (2010), who suggest that the ease and expense of obtaining a visa are important for a country in attracting international students.

Import and export shares yield estimated effects that were opposite in sign, with the former positive and the latter negative. The estimates suggest that UK imports from developing countries are more likely to increase student applications from these developing countries than UK commercial success in gaining access to their domestic markets.

The July 2005 bombings appear to have exerted a negative impact on visa applications, though some circumspection is required in interpreting this effect as it appears sensitive to the inclusion of a lagged refusal rates variable. Taken at face value, the estimated effect could reflect increased security concerns and heightened risk perceptions among student applicants. In addition, expectations of a tighter vetting policy by the UK authorities may have played a role in deterring some potential applicants. This inference is strengthened by the fact that the estimate for the post-7/7 dummy is negative and statistically significant in the applications model, but insignificant in a comparably specified visa issues model. This appears consistent with the findings of Lowell and Khadka (2011) that student visa demand post 9/11 contracted as a result of the same fears that depressed tourism demand, and was not directly attributable to a tightening of visa policies. In addition, our results on visa issues also suggest that official UK visa issue policy was not influenced by the terrorist acts perpetrated in London in July 2005, which is in contrast to the US where visa policy changed in the aftermath of 9/11.

Our analysis also allowed us to explore a number of other important themes. For instance, we find that countries with a large Muslim population have higher visa applications and issues than other countries. As expected, countries where the official language is English have a higher demand for UK educational services. Those countries that are geographically closer to the UK also generate higher applications and issues. The formal human capital levels of developing countries are also found to determine student visa demand. In particular, net secondary enrolment rates exert a well determined positive effect on both applications and issues. Thus, UK development policies that enhance and support the provision of secondary education in developing countries may provide future rewards in the form of an increased demand for the UK's own educational services. The political stability variable is found to be important in determining the volume of visa issues but not applications. This finding emphasizes the important potential benefits that flow from ensuring and supporting stable political and economic environments in developing countries.

In spite of the contribution we believe the empirical analysis reported here makes to the existing literature, the current study suffers from some drawbacks. For instance, we could not explore student visa demand by study activity or type of institution due to the absence of disaggregated visa information over time. In addition, given the heterogeneous nature of the demand investigated, we were not able to explicitly incorporate tuition costs into our analysis. Both of these issues need to be addressed using outcome data drawn from

sources other than visa data, though we do take some comfort from the findings of Beine *et al.* (2011) suggesting that tuition costs are of less importance than living costs in moulding international student location decisions.

A feasible suggestion, however, for future research on the visa demand theme is to investigate the impact of visa policies changes, such as the newly introduced Points Based System (PBS), on the demand for UK student visas. This suggestion is motivated by recent changes introduced to the system in 2009 (which post-date our analysis) and to reforms in the student immigration system that are currently the subject of implementation[30]. However, the identification of causal effects for separate policy changes will prove extremely difficult given the array of new government policies implemented concurrently. For instance, the UK government introduced tougher rules as part of its clamp-down on bogus students after 2008. Under the Tier 4 PBS, which was introduced in 2009, students entering the UK require sponsorship from a university or other UK education institution, and a certain amount of funds to cover course fees and living expenses. In addition, as part of the application process a biometric identification system was also introduced, requiring student applicants to be finger-printed. Applicants were also expected to demonstrate higher English language competency levels. All of these foregoing changes were also coincidental with increases in student visa costs.

The radical changes to student migration policy have dramatically altered the higher educational landscape in the UK in more recent years. In addition, the policy changes are likely to have had differential effects on the demand for student visas depending on the country of origin. In light of the numerous student migration policy changes that have been implemented subsequent to the time period covered by our analysis, it is clear that some of our empirical findings may not be robust to these changes. Thus, our empirical findings should be interpreted and used with a degree of caution.

Endnotes

[1] In this paper the term 'international students' refers to students from non-EU countries, except when undertaking comparisons with the US figures where both EU and non-EU student numbers are conflated.

[2] The data from HESA relate to higher education (i.e., undergraduate and postgraduate) students only and do not include students enrolled in primary, secondary and further education, or students on language courses. HESA reported that for the academic year 2008/09 there were 2,027,085 UK students, 117,660 non-UK EU students, and 251,310 international students studying in the UK.

[3] The British Council reported in 2007/08 that information regarding both the number of students domiciled overseas and the number with non-UK nationalities was provided to HESA for the first time (reports for earlier years only contained information on students domiciled overseas). The total number of international students increases to 513,570 in 2007/08 when the criteria are based on holding a non-UK passport. The nationality field brings the UK international student population closer to the 623,805 international students estimated to be enrolled on study programmes in the USA.

[4] Educational exports here include tuition fees and living expenses in both the higher and further educational sectors.

[5] The importance of international students to the UK education sector is partly reflected in the fact that such students have in the past generally paid higher tuition fees than their UK and EU counterparts.

[6] The PMI2 priority markets are: Australia*, Bangladesh, Brazil, China, Ghana, the Gulf (including Saudi Arabia and the UAE), Hong Kong*, India, Indonesia, Japan*, Korea*, Malaysia, Mexico, Nigeria, Pakistan, Russia, Singapore, Sri Lanka, Taiwan*, Thailand, Turkey, US*, Vietnam. [All countries except those marked with an asterisk are in the dataset for the current research].

[7] These countries are the UK, the US, Australia, Canada, and New Zealand.

[8] Bohm et al. (2004) forecast that between 2003 and 2020 the per annum demand for international student places in the UK is expected to grow by 9.1% for South Asia, 8.3% for East Asia, 5.3% for Africa, 2.3% for the Americas, 2% for the Oceania area and 1.6% for Europe.

[9] However, there are many studies on tourism demand that do not use visa data in their analysis and these include Gray 1966, Crouch 1992, Dritsakisa and Athanasiadis 2000, O'Hagan and Harrison 1984; Fujii et al. 1985, White 1985, Bakkal 1991, Pyo et al. 1991, Divisekera 2003, Durbarry and Sinclair 2003, Li et al. 2004 and De Mello and Fortuna 2005.

[10] However, there are considerable uncertainties regarding the accuracy of statistics relating to UK students studying abroad (Findlay et al. 2010).

[11] This is a European Union educational exchange programme for higher education students, teachers and institutions. It was introduced in 1987 with the objective of increasing student mobility within Europe.

[12] The non-working visa categories are study, business, holiday, and visits to friends and relatives.

[13] Given the construction of the exchange rate in their case, a positive sign implies that a ceteris paribus increase in the amount of Spanish Pesetas per unit of a foreign currency (i.e., a devaluation of the Peseta) increases international tourism flows to Spain.

[14] However, international students are permitted to switch to another visa category without leaving the country upon successful completion of their studies.

[15] The final year for which this publication is available is 2008/09. This dictates the terminal year for the visa data and thus the empirical analysis undertaken.

[16] The CAS was introduced in February 2010. It is an electronic document generated by an educational institution containing a unique student reference number and details about their course for the purposes of applying for a student visa.

[17] The exchange rates based on rates prevailing at the end of July are used under the assumption that most students apply for their visas around this time to commence their studies in September. However, it is acknowledged that visa applications are submitted all year round due to the differing academic calendars governing different programmes of study. As has already been noted, the visa data available are not disaggregated by student type, so we cannot precisely match the exchange rate with the appropriate academic calendar. We thus assume that the bulk of international students to the UK commence their studies around September.

[18] The inclusion of relative price variables would be extremely difficult in the current application given that reliable price level series are absent for most of the developing and emerging economies included here.

[19] It could be argued that the export data are subject to a potential endogeneity problem given exports include tuition fees data. This issue is not econometrically addressed here. However, given the use of share data here we believe this is not likely to present as a significant problem in the current application, given the UK's aggregate export shares with other countries are unlikely to be substantially affected by movements in the educational tuition fees of developing country students in the UK.

[20] Our approach follows that of Neiman and Swagel (2009), who also used country-specific time trends in their analysis of US visa patterns.

21 It is acknowledged that the specified model is ad hoc and ignores other factors that are potentially important. For example, it does not capture the role of alternative student destinations. An investigation of this factor would require a richer dataset than the one available to us, and would require compiling information from an extensive range of developed countries supplying educational services (e.g., US, Canada, Australia and selected other European countries). This obviously represents a more ambitious and extensive project than the one conducted here.

[22] Researchers have examined the relationship between labour migration and trading patterns but have generally focused on the causal relationship that runs from the labour migration stock to trade flows. For instance, Gould (1994), Girma and Yu (2000), and Bryant et al. (2004) explore this issue using data for the US, UK and New Zealand respectively. In contrast, Bruder (2004), using data for Germany, noted the absence of any link from labour migration to trade but, reversing the causality, found a negative relationship between trade volumes and labour migration.

[23] During the week immediately after the 7/7 bombings the London Metropolitan Police were responsible for the death of an innocent Brazilian, Jean Charles de Menezes, who was mistaken for a putative bomber on London's underground public transportation system. One side-effect of this tragedy was to reduce student visa applications from Brazil by 23% in the following year. Applications from this growing market remained well below the 2005 level by the terminal year of our analysis.

[24] If we add the lagged refusal rates to the visa issues model reported as column one in table 2, the estimated effect is poorly determined with a t-ratio of -1.05 and a prob-value of 0.30.

[25] Given the inclusion of country-specific time trends in the original regression models, these fixed effects reflect country-specific factors as of 2000, the year prior to the start date of the time period, and are thus independent of any taste changes or other country-specific trends that may have been present in the visa data over the period of our analysis.

[26] The only blemish here is in regard to the RESET value obtained for the visa issues model.

[27] It could be argued that where English is an official language, student visa applications are more likely to be for educational services not involving language tuition. However, it could equally be argued that language tuition for students, whose native language is not English, can be an integral part of foundation programmes across a variety of different disciplines and fields of study. Thus, a simple separation of the data between applications from countries where English is an official language and where it is not is unlikely to provide an accurate delineation for these two different types of educational services.

[28] For instance, a one standard deviation change in the political stability index is the difference between political stability conditions in Zimbabwe and Albania, for example.

[29] The estimated Spearman rank order correlation coefficient between being a former colony and possessing a common official language is found to be 0.64 with a prob-value of 0.00.

[30] See House of Commons (2011) for the Home Affairs Select Committee Report on Student Visas, which details arguments governing the proposed policy changes.

Appendix 1

This table contains a list of variable descriptions, sources, and selected summary statistics. See notes in Table 4 for details.

Table 4 Variable descriptions, sources and selected summary statistics

Variable	Description	Source	Means
v	Log of total number of student visa applications per 100,000 of the applicant country population	*UK visa Entry Clearance Statistics (various issues) - UK Border Agency*	1.601 (1.791)
v	Log of total number of student visa issues per 100,000 of the issue country population	*UK visa Entry Clearance Statistics (various issues) - UK Border Agency*	1.249 (1.781)
y	Log of GDP per capita expressed in US Dollars @ 2000 prices	World Development Indicators http://data.worldbank.org/	7.659 (1.367)
x	Log of the bilateral exchange rate between the developing country and the UK expressed in local currency units to the pound sterling	International Financial Statistics (IFS) http://www.imfstatistics.org/	−3.823 (2.843)
c	Log of the real visa cost	Office of Public Sector Information www.opsi.gov.uk/	4.340 (0.153)
im_share	Total imports into the UK from country i as a percentage of total UK imports	UN Comtrade http://comtrade.un.org/	0.231 (0.706)
ex_share	Total exports from the UK to country i as a percentage of total UK exports	UN Comtrade http://comtrade.un.org/	0.181 (0.231)
D_7/7	= 1 if year is post 2005; = 0 otherwise.		0.350 (0.50)
Country-Specific Characteristics:			
Muslim (%)	Percentage of the developing country's population that is Muslim	Islamic Population www.islamicpopulation.com Central Intelligence Agency https://www.cia.gov/	36.271 (39.063)
Common Language	= 1 if country shares an official language with the UK; = 0 otherwise	Centre d'études Prospectives et d'informations Internationales www.cepii.fr	0.348 (0.479)
Log of Distance	Log of distance between capital cities (in kilometres)	Centre d'études Prospectives et d'informations Internationales www.cepii.fr	8.680 (0.584)
Net Primary Enrolments (%)	Total primary level net enrolment rate expressed as a percentage	World Bank Education Statistics Version 5.3	85.291 (14.333)
Net Secondary Enrolments (%)	Total secondary level net enrolment rate as a percentage	World Bank Education Statistics Version 5.3	59.365 (23.059)
Political Stability Index	This is a standardized variable ranging from −2.5 to 2.5 with higher values corresponding to greater political stability. It captures perceptions of the likelihood that the government will be destabilized by unconstitutional means or politically motivated violence.	Worldwide Governance Indicators	−0.398 (0.830)

Notes: (a) The notation v is used for both applications and issues in this table. (b) For the first 8 variables listed 662 observations were used to compute the summary statistics. (c) The summary statistics for the country-specific characteristics are computed based on 89 country-level observations. (d) Standard deviations are reported in parentheses.

Additional file

Additional file 1 **List of Countries.**

Competing interests
The IZA Journal of Labor & Development is committed to the IZA Guiding Principles of Research Integrity. The authors declare that they have observed these principles.

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